

November 20, 2020

To: John Sorrell, City of Raleigh
Tim Beasley, City of Raleigh

From: Mike Sanchez, McAdams *MS*

RE: The Point
Sanitary Sewer Capacity Study
AWH-20000

Introduction and Background

This study was performed to determine the sanitary sewer capacity of the existing sanitary sewer outfall that will serve The Point community in the Town of Rolesville. More specifically, this study evaluates whether the existing gravity system can accommodate the sewage generation from the proposed development of approximately 882 lots on The Point project site located along Highway 401 between Jonesville Road to the west and E. Young Street on the east. Approximately 788 lots will be on the south side of Highway 401 (referred to in this study as The Point South) and 94 lots on the north side of Highway 401 (referred to in this study as The Point North). In coordination with John Sorrell, PE and Tim Beasley, this study evaluates the following two segments of outfall both of which are identified on Exhibit 1:

1. Harris Creek Interceptor outfall beginning at MH 54 (as identified on 1992 as-builts prepared by The Wooten Company). This outfall runs along the west side of The Point North and continues along the west side of The Point South down to the termination point identified on Exhibit 1, and
2. Rolesville Sanitary Sewer Outfall beginning at MH 31 (as identified on 2007 as-builts prepared by BNK) near Rolesville High School and west to the connecting manhole along the Harris Creek Interceptor.

Exhibits 2, and 3 provide a more detailed view of the outfall segments evaluated in this study.

Approach

The following approach was used for completing this sanitary sewer capacity analysis:

1. Water meter data was obtained from the City of Raleigh for the developed area within the sewage basin north of The Point North and for Rolesville High School as shown in Table 1A.
2. As noted by the City of Raleigh, water meter data was available for all but 43 lots. Therefore, based on the number of lots for which there was water meter data, an average flow per lot was determined for each area and applied to all lots in that area as shown on Table 1A.
3. The City of Raleigh Public Utilities Handbook Sewer Capacity Study Departmental Operating Instructions (effective 12/03/2013) requires that peak flow pass through half full pipe. Table 1B provides the peak flow calculations for each flow entering the system. Where water meter data is used, no peak factor is applied.
4. For calculation of peak flow for The Point, the City of Raleigh sewage generation rate of 250 gpd / lot is used to calculate average daily flow for single-family and townhomes. The standard operating instructions

referenced above also define the peaking factor as 2.5, which was applied to calculate the peak flow for The Point.

5. Table 1B identifies the manholes where the sewage generated by the existing lots, the anticipated sewage from The Point, and the anticipated sewage from future development within the sewer basin were assumed to enter the existing gravity sewer outfall. Exhibits 4 and 5 graphically identify the discharge points to the existing outfall for lot segments within The Point.
6. For each pipe evaluated in this study, as-built data (diameter, material, slope, and length) were input into a capacity calculation spreadsheet that uses standard Manning's equations to calculate full and half full capacities.
7. In addition, sewage flow rates determined as described above, were also input into the capacity calculation spreadsheet to determine cumulative flow rates and remaining capacities for each existing sewer line that is part of this study.
8. The results of these calculations are provided in the following Tables:
 - a. Table 2 – MH 01 to MH 31 Existing Conditions + The Point
 - b. Table 3 – MH 22 to MH 54 Existing Conditions + The Point
 - c. Table 4 – MH 22 to MH 54 Existing Conditions + The Point + Kalas Falls + Wheeler Tract
 - d. Table 5 – MH 22 to MH 54 Existing Conditions + The Point + Kalas Falls + Wheeler Tract with Improvements
 - e. Table 6 – MH 22 to MH 54 Existing Conditions + The Point + Kalas Falls + Wheeler Tract + Future Development within sewer basin with improvements

Summary

This summary evaluates the results under two criteria set by CORPUD. First, for pipes where peak sewage flow resulting from existing conditions plus the proposed development is predicted to exceed 50% of pipe capacity, a fee-in-lieu is owed by the developer to cover the costs associated with future improvements. Second, for pipes where the peak sewage flow for existing conditions plus the proposed development is predicted to exceed 65% capacity, the developer must install the necessary improvements to rectify the situation.

As shown in Table 2, under existing conditions and anticipated sewage from The Point, sewage flow does not exceed 50% capacity in any of the Rolesville Sewer outfall pipes. However, as shown in Table 3, the anticipated sewage flow does exceed 50% capacity in the Harris Creek Interceptor at 18 pipes but sewage flow is not projected to exceed 65% capacity in any of the pipes.

When the anticipated sewage flow from the proposed Kalas Falls and Wheeler Tract developments are added, as shown in Table 4, sewage flow is projected to exceed 50% capacity in eight pipes and to exceed 65% in 10 additional pipes. Table 5 shows that when those pipes are increased from 10-inch to 15-inch pipes the anticipated flow is all projected to flow under 50% capacity. However, as mentioned above, in order to determine the ultimate size of improvement needed, the City of Raleigh requires that the entire sewage basin be considered so that those areas that are currently undeveloped or underdeveloped based on the zoning can be developed without requiring future

pipe size increases. Exhibit 6 shows the approximate sewer basin. Several areas within this sewage basin are currently undeveloped or underdeveloped. Per the Town of Rolesville Future Land Use Map, a variety of zoning classifications are projected for these areas including medium density residential, business park, and high density residential. For the purposes of this study, future developed was projected to be most closely medium density residential. Using a peak flow (gpapd) from Section 7.1.7 of the Public Utilities Handbook Appendix E Sewer Capacity Study Departmental Operating Instructions (effective 12/03/2013) for Residential – 4 zoning, a peak flow of 2,000 gpapd was applied to these areas and the projected sewage flow from these areas were assumed to enter the gravity system considered in this study at the manholes indicated in Table 1B. With the future development flows, Table 6 indicates that the required improvements for the 10 pipes where sewage flow was projected to flow over 65% in Table 5, will require those pipes to be upsized to 24-inches in order for the projected flow to not exceed 50% capacity of the pipes.

Conclusion

To accommodate the projected sewage generation for The Point, Kalas Falls, the Wheeler Tract, and future development in the remaining sewer basin in accordance with City of Raleigh standards, sewer improvements would be required. More specifically, 10 pipes beginning at MH 32 along the Harris Creek Interceptor down to MH 22 would need to be upsized from its current 10-inch diameter to 24-inches.

ATTACHMENTS:

Exhibit 1 – The Point Overall Sanitary Sewer

Exhibit 2 – The Point Sanitary Sewer Outfall (1 of 2)

Exhibit 3 – The Point Sanitary Sewer Outfall (2 of 2)

Exhibit 4 – Sewage Discharge Points from The Point South to Existing Outfall

Exhibit 5 – Sewage Discharge Points from The Point North to Existing Outfall

Exhibit 6 – Sanitary Sewer Basin

Table 1 (A&B) – Sewage Generation

Table 2 –Sewer Capacity Spreadsheet – Existing Conditions and The Point (MH 1 to MH 31)

Table 3 –Sewer Capacity Spreadsheet – Existing Conditions and The Point (MH 22 to MH 54)

Table 4 –Sewer Capacity Spreadsheet – Ex Conditions + The Point + Kalas Falls + Wheeler Tract (MH 22 to MH 54)

**Table 5 –Sewer Capacity Spreadsheet – Ex Conditions + The Point + Kalas Falls + Wheeler Tract (MH 22 to MH 54)
with Improvements**

**Table 6 –Sewer Capacity Spreadsheet – Ex Conditions + The Point + Kalas Falls + Wheeler Tract + Future
Development within Sewer Basin (MH 22 to MH 54) with Improvements**